

Tineid moths (Lepidoptera, Tineidae) from Goshawk and Ural Owl nests in Japan, with notes on larviparity of *Monopis congestella* (Walker)

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Abstract Two species of the family Tineidae, *Monopis congestella* (Walker) and *M. pavlovskii* (Zagulajev), were reared from detritus of Goshawk and Ural Owl nests after breeding in Japan. *M. congestella* was newly added to the Japanese moth fauna. The larvae fed on the feather, fur, pellets, and skin and flesh attached to bird bones in the detritus. The moths from Goshawk nest were recorded for the first time. The larviparity of *M. congestella* was confirmed.

Key words *Monopis congestella* (Walker), *Monopis pavlovskii* (Zagulajev), larviparity, keratophagy, nidicolous fauna.

Introduction

Insect fauna associated with bird nests has been well studied in Europe and North America, and species of several Lepidoptera families (Tineidae, Oecophoridae, Pyralidae, etc.) have been identified (Nordberg, 1936; Woodroffe, 1953; Hicks, 1959, 1962). Hicks (1959, 1962) listed 13 families and over 55 species of Lepidoptera from many bird nests. In contrast to the situation in the West, the moth fauna of Japanese bird nests has not been well investigated: two tineids, *Tinea translucens* Meyrick, 1917 and *Tineola bisselliella* (Hummel, 1823), and three pyralids, *Pyralis farinalis* (Linnaeus, 1758), *Aglossa dimidiata* (Haworth, 1810) and *Plodia interpunctella* (Hübner, 1813), were found in the nests of Tree Sparrow *Passer montanus* (L.) (Ploceidae), House Swallow *Hirundo rustica* L., Red-rumped Swallow *H. daurica* L. (Hirundinidae) and Rock Dove *Columba livia* Gmelin (Columbidae) (Isomura, 1930; Kiritani, 1959; Tomioka and Nakamura, 2000). Recently Nasu *et al.* (2007a, b) successfully reared four tineids, *Niditinea baryspilas* (Meyrick, 1937), *Monopis pavlovskii* (Zagulajev, 1955), *M. flavidorsalis* (Matsumura, 1931) and *M. sp.*, and one oecophorid, *Martyringa ussuriella* Lvovsky, 1979, from the nest boxes of Ural Owl *Strix uralensis* Pallas (Strigidae) and Great Tit *Parus major* L. (Paridae) in Japan.

In 2007, we obtained two tineid moths from nests of Goshawk *Accipiter gentilis* (L.) (Accipitridae) and Ural Owl after breeding in Japan. The moths from Goshawk nests were recorded for the first time. One of these two moths, *Monopis congestella* (Walker, 1864) has been hitherto unrecorded from Japan. Furthermore some specimens of this species were discovered also in the collection of the Entomological Laboratory, Osaka Prefecture University.

In the following lines we record the two species as nidicolous moths, with biological notes on both species, illustrations of adult and genitalia of *M. congestella* and notes on larviparity of Tineidae.

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Materials and methods

The present study is based on specimens reared from the detritus of Goshawk and Ural Owl nests in 2007 and collected by light trap in 1954–2002. The following acronyms are used for the depositories of specimens: OPU—Entomological Laboratory of Osaka Prefecture University, Sakai, Japan; YNC—Collection of Y. Nasu.

Detritus from the bottom of three Goshawk nests at three localities (two: Hirakata-shi and Ibaraki-shi, Osaka Prefecture, and another: Hiroshima Prefecture) and two Ural Owl nest boxes at two localities (Okazaki-shi, Aichi Prefecture, and Takashima-shi, Shiga Prefecture), which had been abandoned by young birds in 2007, were collected. Detritus from the Goshawk nests was collected on July 7, 2007 at Ibaraki-shi, on August 19 at Hirakata-shi, and August 23 at Hiroshima Prefecture, and that from the bottom of the Ural Owl nest boxes on June 26 at Okazaki-shi, and on July 7 at Takashima-shi. Feathers, pellets and bone were separated from the detritus, and all identified moth larvae were reared in cases (ht 3 cm, dia. 9 cm) under laboratory conditions. The remaining detritus was put into large cases (30×23×10 cm) under the same conditions.

Male and female genitalia were dissected after being macerated in 10% KOH fluids for about twenty hours at 40°C, and stained with Chlorazol Black E. Images of adults and immature stages were obtained using a digital camera, Olympus E-500, and those of genitalia using a digital camera, Nikon Coolpix 8400, attached to a microscope, Nikon Eclips E200. Digital images of adults, genitalia and immature stages were enhanced using Microsoft Photo Editor and Adobe Photoshop software. The Japanese bird names follow the Committee for Check-List of Japanese Birds (2000).

Results

Two species of Tineidae, *Monopis congestella* and *M. pavlovskii*, were successfully reared from the detritus of Goshawk nests and Ural Owl nest boxes.

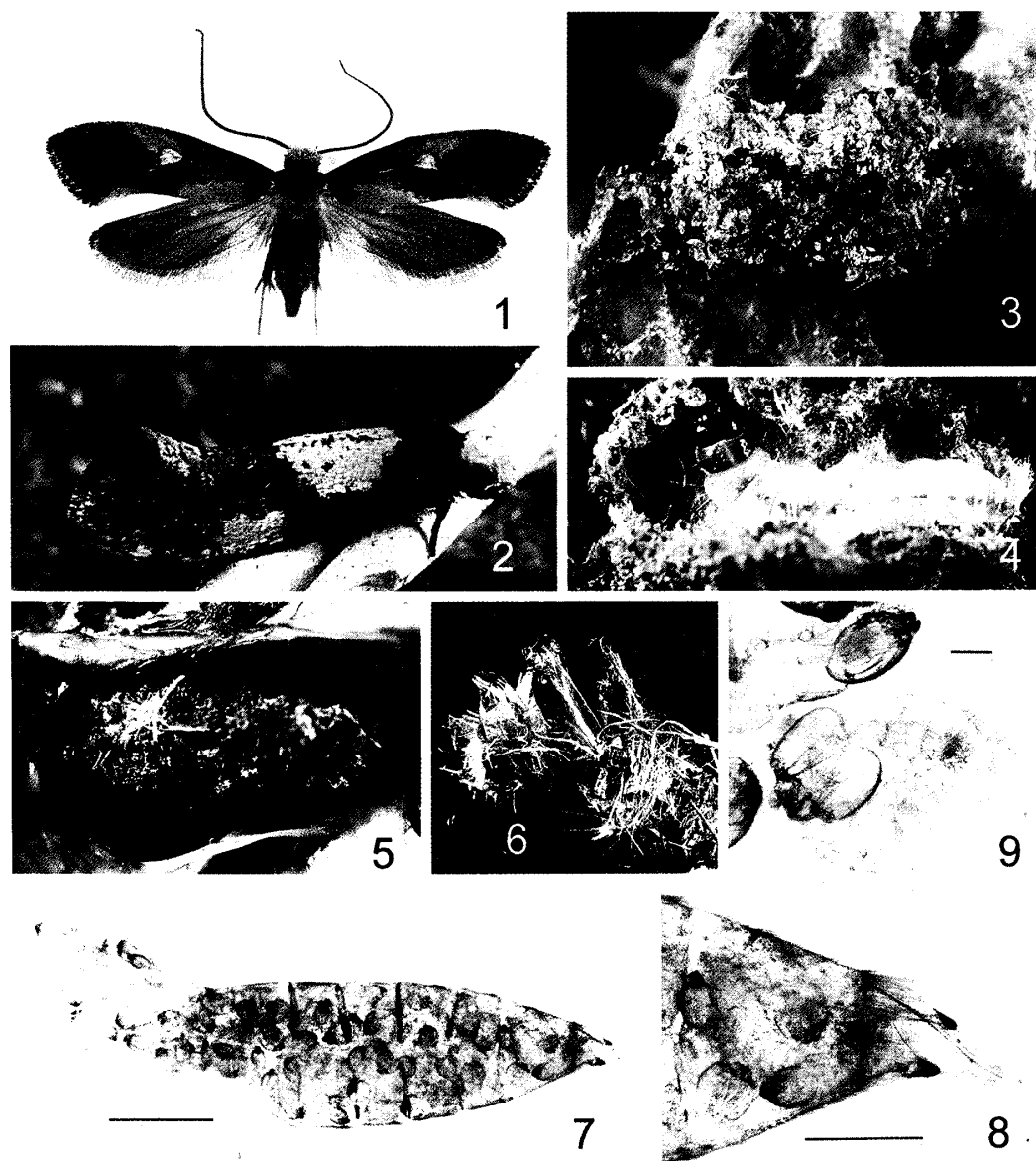
Monopis congestella (Walker, 1864) (Figs 1–11)

Rhithia congestella Walker, 1864, *List Specimens lepid. Insects Colln Br. Mus.* **29**: 819.

Monopis congestella: Robinson, 1988: 41; Robinson, 1990: 305; Robinson *et al.*, 1994: 26; Robinson & Tuck, 1996: 14.

Material examined. JAPAN. Honshu: Aichi Pref., Okazaki-shi, 59 ♂ ♀, emerged 12–29. vii. 2007 (G. H. Huang leg.), *ex* Ural Owl nest box, OPU. Shiga Pref., Takashima-shi, 18 ♂ ♀, emerged 29. vii–6. viii. 2007 (G. H. Huang leg.), *ex* Ural Owl nest box, OPU. Osaka Pref., Ibaraki-shi, 2 ♂ 4 ♀, emerged 20–31. viii. 2007 (Y. Nasu leg.), *ex* Goshawk nest, YNC; Minoh-kohen, 1 ♂, 9. vii. 1998 (T. Saito leg.), 1 ♂, 21. vi. 1999 (T. Ohno leg.), OPU; Mt Makio-san, 1 ♀, 13. viii. 1979 (K. Yasuda leg.), OPU; Mt Iwawaki-san, 1 ♂, 29. vi. 1954 (A. Mutuura leg.), OPU; Mt Izumikatsuragi-san, 1 ♀, 18. viii. 2001 (T. Hirowatari *et al.* leg.), OPU. Kyushu: Fukuoka Pref., Mt Hiko-san, 1 ♂, 15. vi. 1958 (H. Kuroko leg.), OPU. Kagoshima Pref., Amami-oshima Is., Sntaro-toge, 3 ♂, 1. v. 1998 (T. Saito leg.), OPU; Tyuo-rindo, 1 ♀, 4. v. 1999 (T. Saito leg.), OPU; Nishinakama, 1 ♂, 12. ix. 2002 (T. Ueda leg.), OPU. Ryukyu: Okinawa Pref., Okinawa-jima Is., Mt Yonaha-dake, 1 ♂, 8. iv. 1996 (T. Ueda leg.), OPU; Ishigaki-jima Is., Mt Banna-dake, 1 ♂, 15. xi. 1980 (Y. Arita leg.), OPU, Mt Omoto-dake, 1, 11. v. 1998 (T. Ueda leg.), OPU; Iriomote-jima Is., Nakamagawa, 1 ♂, 27. xi. 1996 (T. Ueda leg.), OPU.

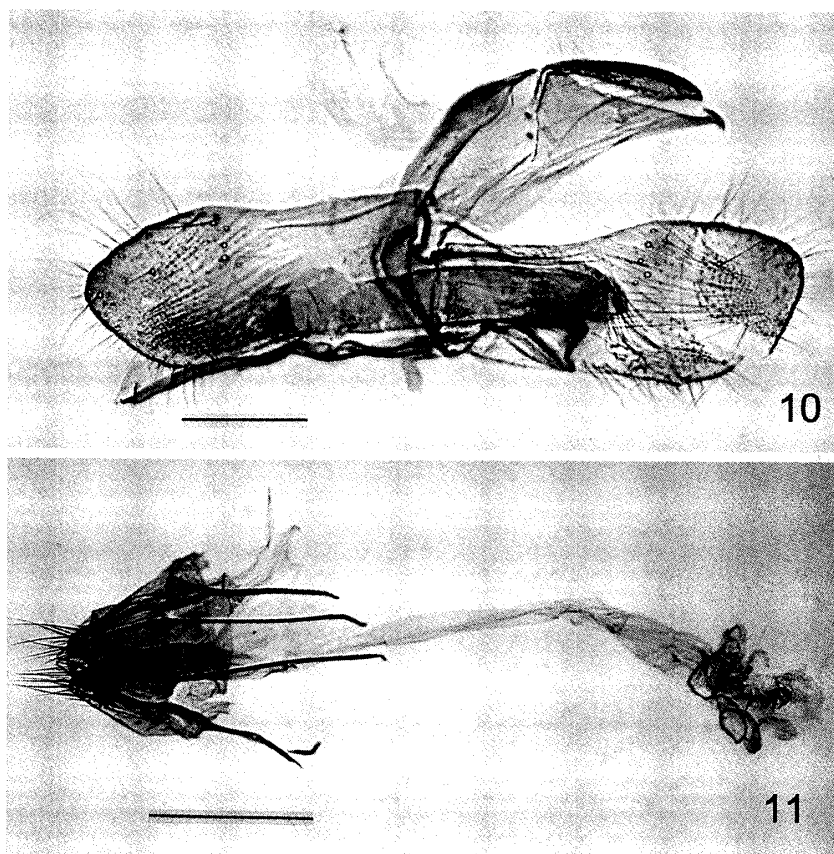
Diagnosis. Sexual dimorphism is not pronounced. This moth is a medium-sized tineid



Figs 1-9. *Monopis congestella* (Walker). 1. Adult, ♀. 2. Adult, resting posture. 3. Portable case of larva. 4. Larva in portable case. 5. Cocoon. 6. Pupal skin protruded from cocoon. 7. Female abdomen filled with many small larvae. 8. *Ditto*, caudal part. 9. Fully-developed first instar larvae in the female abdomen. Scale lines: Fig. 7: 1 mm; Fig. 8: 0.5 mm; Fig. 9: 0.1 mm.

(wing expanse 12-16 mm) with whitish yellow head, blackish brown ground color overlaid with purple, a semi-transparent patch in the middle of the forewing and two whitish yellow patches, one on the middle of the costa and the other on the base of the dorsum (Figs 1, 2). The male genitalia are characterized by a broad rectangular valva and cylindrical phallus (Fig. 10). The female genitalia are characterized by a short eighth segment, short apophyses and several thorn-like signa (Fig. 11). The larva has a milky white body, with brownish head and prothoracic shield (Fig. 4).

The species is easily distinguishable from its congeners in Japan by the blackish brown forewing with two whitish yellow patches.



Figs 10, 11. Genitalia of *Monopis congestella* (Walker). 10. ♂, right valva broken, genitalia slide no. YN1304. 11. ♀, genitalia slide no. YN1305. Scale lines: Fig. 10: 0.2 mm; Fig. 11: 0.5 mm.

Distribution. Thailand, Malaysia, Philippines, Japan (Honshu, Kyushu, Ryukyu).

Biology. The adults are attracted to light. The breeding and collecting data indicate that the species has several generations per year. The larvae fed on keratin sources (feather, fur, pellets) and flesh attached to bone in the detritus of nests of Goshawk and Ural Owl. The larva constructed a portable case, which was elongate-oval, constricted medially, made of fur and feces (Figs 3, 4). Before pupating, the fully-grown larva constructed a spindle-shaped cocoon made of fur and feces (Fig. 5). The pupa protruded from the cocoon before emergence (Fig. 6). The moth is larviparous, and female abdomens were filled with many small larvae (first instar larvae) (Figs 7, 8). The larvae are fully-developed, all of the same size, with mouthparts, ocelli, legs and setae, and folded in two below in the middle (Fig. 9). Dissecting two female specimens collected by light trap, a maximum 51 larvae per female abdomen were recognized.

Remarks. The species has been known to be larviparous (Robinson, 1988, 1990; Robinson *et al.*, 1994), and the Japanese female abdomens were also filled with many small larvae.

***Monopis pavlovskii* (Zagulajev, 1955)**

Monopis (Blabophanes) pavlovskii Zagulajev, 1955, *Trudy Zool. Inst. Leningr.* **21**: 282.

Monopis pavlovskii: Petersen & Gaedike, 1993: 247; Ponomarenko & Park, 1996: 278; Robinson & Tuck, 1996: 14; Ponomarenko, 1997: 356; Oku, 2003: 12; Nasu *et al.*, 2007a: 608; Nasu *et al.*, 2007b: 93.

Monopis monachella (nec Hübner, 1796): Moriuti, 1982: **1**: 169, **2**: 187.

Material examined. JAPAN. Honshu: Osaka Pref., Hirakata-shi, 1 ♂, emerged 31. viii. 2007 (Y. Nasu leg.), YNC; Ibaraki-shi, 1 ♂ 1 ♀, emerged 27–28. viii. 2007 (Y. Nasu leg.), YNC. Hiroshima Pref., 1 ♂, emerged 31. viii. 2007 (Y. Nasu leg.), YNC. All specimens emerged from Goshawk nests.

Distribution. Iran, Pakistan, China, Korea, Far East of Russia, Japan (Honshu, Shikoku, Kyushu).

Biology. The adults are attracted to light. The larvae feed on keratin sources (feather, fur and pellets) in the detritus of Goshawk nests. The larvae were discovered also from other bird nests, Ural Owl and Great Tit, and carnivore feces (Nasu *et al.*, 2007a, b). According to Nasu *et al.* (2007a), the larvae in the Ural Owl nest box constructed a tube-like larval case made of fur. Pupation took place in a flat oval cocoon of fur. The pupa protruded from the cocoon before emergence.

Remarks. The moth has a conventional reproductive system, oviparity. Dissections of five female moths of the present species and four of *M. flavidorsalis* (Matsumura, 1931) collected by a light trap (preserved in OPU) demonstrated oviparity in both species.

Discussion

The present paper is the second record of larviparity in Japanese Lepidoptera after Moriuti (1968) reported briefly on larviparity in *Acrolepia* sp. (Acrolepiidae), of which the female abdomen held a single larva. Larviparity is extremely rare in Lepidoptera, and has been known in several families: Tineidae (Scott, 1863; Diakonoff, 1952, 1955; Robinson, 1988, 1990, 2004; Robinson & Nielsen, 1993; Robinson *et al.*, 1994), Cosmopterigidae, Walsiidae (Robinson, 2004), Coleophoridae (Toll, 1962), Acrolepiidae (Moriuti, 1968, 1994). Larviparity within the Tineidae is found in several species of South-east Asian *Monopis* Hübner, 1825 and Andean *Tinea* Linnaeus, 1758 (Robinson, 2004). The female abdomen of larviparous *Monopis* is filled with many fully-developed larvae (first instar larvae) (Fig. 7). All larviparous *Monopis* are keratophagous, and are frequently found in bird nests. The evolution of larviparity in the genus may be associated with the nest-dwelling habit. The shortened eighth segment and apophyses of the female genitalia in the present species are considered to be an adaptation to larviparity as seen in other larviparous species of *Monopis*.

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摘 要

日本においてオオタカとフクロウの巣から発見されたヒロズコガ(鱗翅目, ヒロズコガ科)とフタモンヒロズコガ(新称)の幼虫産出性(那須義次・黄 国華・村濱史郎・広渡俊哉)

2007年, 営巣後のオオタカとフクロウの巣を調査したところ, 前者の巣から日本新記録のフタモンヒロズコガ(新称) *Monopis congestella* (Walker) とマエモンクロヒロズコガ *M. pavlovskii* (Zagulajev), 後者からもフタモンヒロズコガの発生を確認した. これら幼虫は, 巢内のケラチン源(羽毛, 毛, ペリットなど)を摂食していた. オオタカの巣から発生した蛾の記録ははじめてである. 大阪府立大学昆虫学研究室の標本を調査したところ, 日本各地から採集されていたフタモンヒロズコガの標本も見いだした.

幼虫産出性は鱗翅目では極めて珍しいが, ヒロズコガ科を含むいくつかの科で知られている. 東南アジアのフタモンヒロズコガは, 幼虫産出性を示すことが知られているが, 灯火採集された日本産の2♀成虫の腹部内に1♀あたり最大51個体の幼虫が見いだされたため, 日本産も幼虫産出性であることが確認された.

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